# Bulletin No. 1137

# Smallpox and Vaccination

Recent, authoritative data in condensed question-and-answer form. Including a supplement of 21 exhibits in natural colors showing actual appearance of reactions to smallpox vaccination, with key to differential diagnosis of vaccinia, vaccinoid and immune reactions.

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SEE COLOR EXHIBITS OPPOSITE PAGE 14

*Courtesy, The New York Academy of Medicine*

## JENNER'S FIRST VACCINATION

*From the painting by Gaston Melingue*

The boy Phipps is being vaccinated against smallpox with vaccine lymph taken from the hand of Sarah Nelms, suffering with cowpox. She is binding her old sores, and in the foreground her dairymaid paraphernalia may be seen. Jenner wields an historic lancet. The scene is Berkeley, England, the date May 14, 1796

Smallpox and vaccination

Dk

~~BULLETIN NO. 1137~~

# SMALLPOX AND VACCINATION

BY J. P. LEAKE, SURG., UNITED STATES PUBLIC HEALTH SERVICE

THE following questions are not infrequently asked by physicians in regard to variola and its prevention. Part of the answers given are supported by good evidence, part by conclusive evidence, but much, unfortunately, is only opinion, a personal weighing of such evidence as is at hand; yet each of the questions should have a tentative answer, according to the best light available. Further information may change the answers given here. Though for nearly every statement that can be made concerning smallpox some support can be found in the literature, a few of the observations here recorded are original. It is hoped that many of the gaps in our knowledge of smallpox and vaccination may soon be filled. Of all infectious diseases prevalent in the United States this disease is the most completely preventable by public health measures.

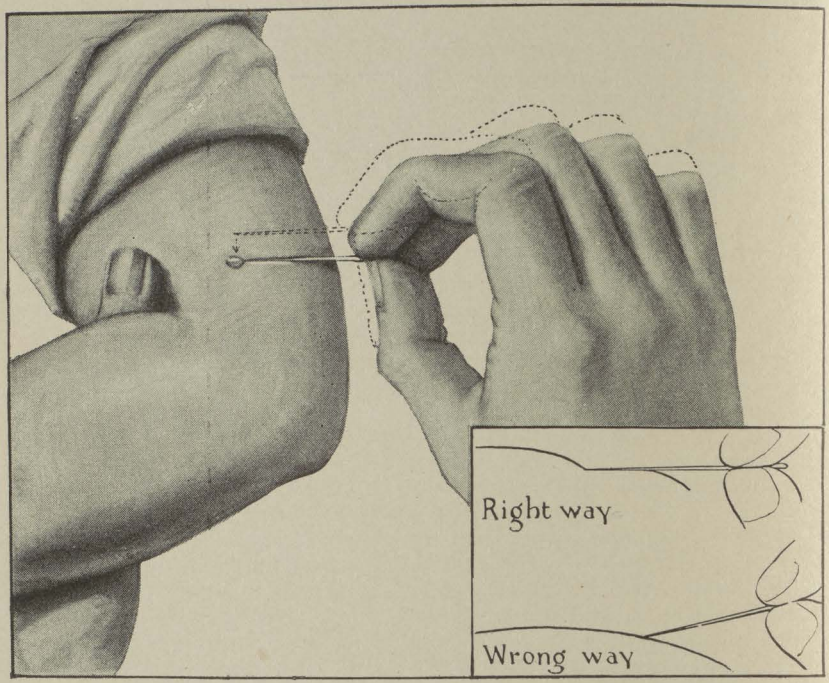
1. *What is the best method of vaccination?*

Probably the "multiple pressure" method.* This consists of a shallow, tangential pricking of the cleansed, but not irritated skin with a needle, through a drop of smallpox vaccine, covering an area not greater than one-eighth of an inch (3 millimeters) in diameter. This gives little chance of accidental infection and the eruption is typical. Acetone has been found satisfactory for cleansing the skin. It is somewhat more efficacious and rapidly drying than alcohol.

The needle, which should be new, sharp, and sterile, is not thrust into the skin, but is held quite parallel or tangential to it, with the forefinger and middle finger of the right hand above the needle and the thumb below, the needle pointing to the operator's left. The needle should be crosswise of the arm so that the thumb of the operator is not impeded by hitting the skin. The *side* of the needle point is then pressed firmly and rapidly into the drop about 30 times within five seconds, the needle being lifted clear of the skin each time.

This rapid up-and-down motion of lifting the needle and pressing it against the skin should be quite perpendicular to the skin and needle, and not in the direction of the long axis

*Various names have been applied to different forms of this method, including "acupuncture," "multiple puncture," and the names of different individuals who have made slight modifications and have been responsible for its use. Perhaps the Suttons, of London, in the prevaccinal inoculation days (1763) were the first to attempt to deposit vaccine between the skin layers, and Jenner himself used a form of this method in some of his early vaccinations. Doctor Kinyoun, formerly of the United States Public Health Service, and Dr. H. W. Hill, then of the Minnesota State Board of Health, were chiefly responsible for the introduction of the method in a modern form, making oblique punctures with a needle instead of a lancet. The method, as modified by Dr. J. P. Leake, U.S.P.H.S., and described above, differs in only two or three details from that used by Kinyoun and Hill, principally in that the needle is held entirely parallel or tangential to the skin, and is




*Redrawn from Dr. Benjamin White's illustration, Boston Medical & Surgical Journal, 193:211*

**Fig. I. The "multiple pressure" method of vaccination, showing the rapid up-and-down motion of the side of the needle, held by the hand at the right, against the drop of vaccine on the arm at the left**

of the needle. The point is not driven into the skin, but at each pressure the elasticity of the skin will pull a fraction of an inch of the epidermis over the point of the needle so that the vaccine is carried into the deeper layers of the epidermis, or just beneath these layers, where multiplication takes place most easily. If the skin has not been unduly rubbed in cleansing, and if the pressure is entirely perpendicular to the needle, no signs of bleeding should occur and all evidence of the vaccination will fade out in less than 6 hours.

Immediately after the pressures have been made, the remaining vaccine is wiped off the skin with sterile gauze and the sleeve pulled down, the whole operation of pressing and wiping taking less than 10 seconds. With strong vaccine a single pressure not

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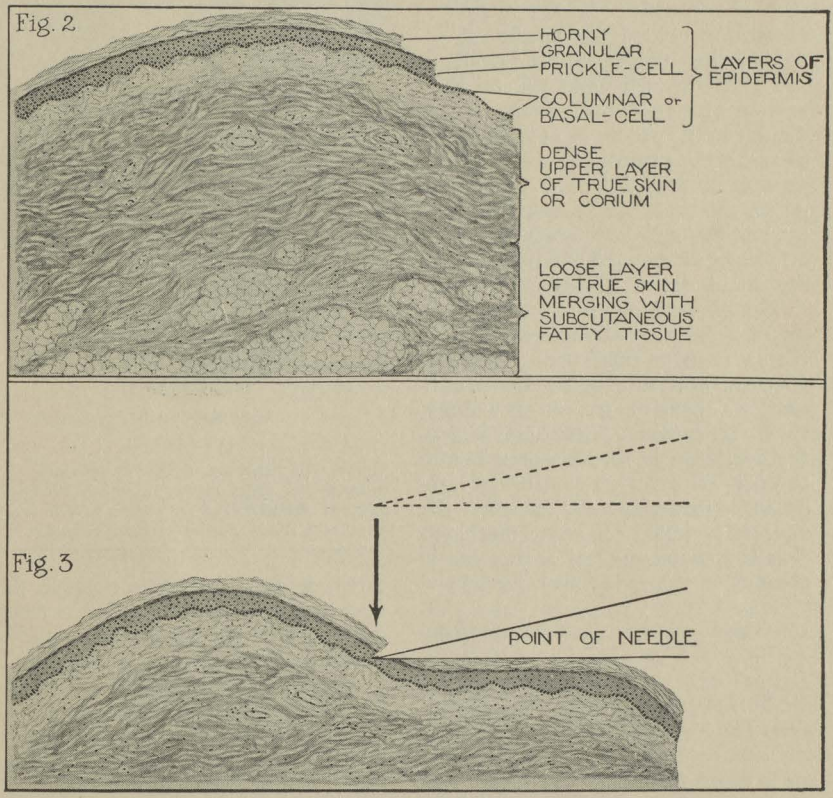
pressed sidewise. A description was sent to Dr. Benjamin White, who published it in the Boston Medical and Surgical Journal of July 30, 1925. The second printed description of this method was that courteously distributed to physicians of Providence, R. I., later in 1925 by the dean of American health officers, Dr. Charles V. Chapin.

None of the names suggested is sufficiently descriptive; "acupuncture" and "multiple puncture" both imply a driving motion of the needle through the skin layers instead of the simple pressure of the side of the point; even "prick" and "tattoo" are suggestive of more direct puncture. "Multiple pressure" may best convey the idea.

infrequently gives success. Only 6 pressures or punctures were formerly advocated; comparative tests showed this to be inferior to the scratch method in percentage of successful vaccinations. By the use of 30 pressures this difficulty has been overcome, and the percentage of successes is as high as with any other safe method.

For primary vaccinations, where the mildest success possible is desired, and where other attempts with highly potent vaccine will be made promptly if the first is unsuccessful, the number of pressures may be reduced to 10, or even to a single pressure.

The disadvantages of this method, which it shares with some other methods, are, first, that without




*Redrawn from U. S. Public Health Service diagrams*

**Figs. 2 and 3. Diagrammatic sketch of pressure method of vaccination. Fig. 2 shows the relation of the skin layers before the pressure of the needle has been applied.**

**Fig. 3 shows the motion of the needle from its first position above and parallel to the skin, as indicated by the dotted outline, to its final position pressing against the surface of the skin and entering it slightly. (Magnification 25 diameters. To save space, the curvature of the surface of the arm is much exaggerated and the perpendicular distance which the needle moves is diminished in proportion to this magnification.)**

demonstration and practice the technique of applying the proper pressure may not easily be acquired, and second, that without due care an area larger than one-eighth of an inch (3 millimeters) in diameter may be covered by the insertion. In regard to the first point, the difficulty is usually that the needle is not pressed in the right direction or that the pressure is not firm enough. Provided the needle is held quite tangential to the curve of the arm, and the direction of motion quite perpendicular to the needle, it is difficult to make the rapid pressures too firmly. In regard to the second point, the area can be kept small by resting one's wrist against the arm being vaccinated and by moving the hand from the wrist only.

The advantages of this method are its mildness and painlessness, the fact that it is more rapid than any other effectual and safe method, the fact that no control site is necessary, since the evidence of trauma due to the operation has disappeared before the first observation for an early reaction is made, and the fact that the vaccine is wiped off immediately, so that the uselessness of a dressing is obvious to the person vaccinated.

EDWARD JENNER
1749-1823

Jenner! for ever by thy honour'd name
Among the children of mankind be blest
Who by thy skill has taught us how to tame
One dire disease—the lamentable pest.*

2. *What is the best vaccination dressing?*

The most open treatment practicable. The ideal to be sought is to keep the site cool and dry, so as to promote rapid formation of a firm crust and to avoid maceration and rupture of the vesicle. In the case of primary vaccinias and vaccinoids (see answer to question 7), warning should always be given against tight or unduly heavy clothing, moisture from bathing or perspiration, and even repeated washing with alcohol, all of which interfere with desiccation during the vesicular and crusting stages. Such warnings are unnecessary in the case of mild immune reactions. If the vesicle or crust of a vaccinia or vaccinoid has been soiled or moistened with perspiration, it may be cleansed by wiping with acetone on sterile gauze or on a clean, freshly ironed handkerchief. If necessary to prevent soiling of the clothing, a fold of sterile gauze may be attached to the garment, not to the skin.†

*From Southey's little-known tribute to Jenner. It occurs in *A Tale of Paraguay*, published in 1825, canto 1, stanzas 1 and 3.

†EDITOR'S NOTE. Such a dressing is now commercially available; see page 21.

Occasionally a severe "take" may require a few days of antiseptic dressings; primary vaccinations should be inspected at least once between the ninth and the fourteenth days to insure that desiccation is proceeding properly. If progress is satisfactory, the crust, which is nature's own protection, should be allowed to remain on the arm and kept dry until it is easily removed and the skin is found to be healed beneath it.

There is no objection to a light sterile dressing for the first few days after vaccination, provided the arm is under constant competent surgical attention and maceration is prevented, but such provision is seldom assured. Dressings during the vesicular stage require frequent attention and renewal, tend to prevent drying, and if attached to the skin usually adhere to the top of the vesicle so that the natural protection is torn off when the dressing is removed. Shields of celluloid, felt, or similar materials are particularly objectionable.

3. *Are there any objections to vaccination on the leg?*

Yes. Leg vaccinations are exposed to more moisture, and to more contamination from street dust, than vaccinations at the region of the deltoid insertion. On account of blood stasis, primary leg vaccinations in adults are often accompanied by a purplish discoloration, and result in a large, slowly healing ulceration; they usually cause temporary disability. Vaccination on the arm when performed by the multiple-pressure method described above causes no disfigurement; the resulting vaccination scar is definite and typically pitted for inspection purposes, but hardly noticeable otherwise except as a "sanitary dimple."

4. *Is early surgical treatment of the vaccination vesicle satisfactory, such as opening and applying antiseptics?*

Yes; provided constant, competent care is exercised thereafter until healing is complete. However, the maximum immunity is not obtained until the red areola has reached its greatest diameter and begun to fade.

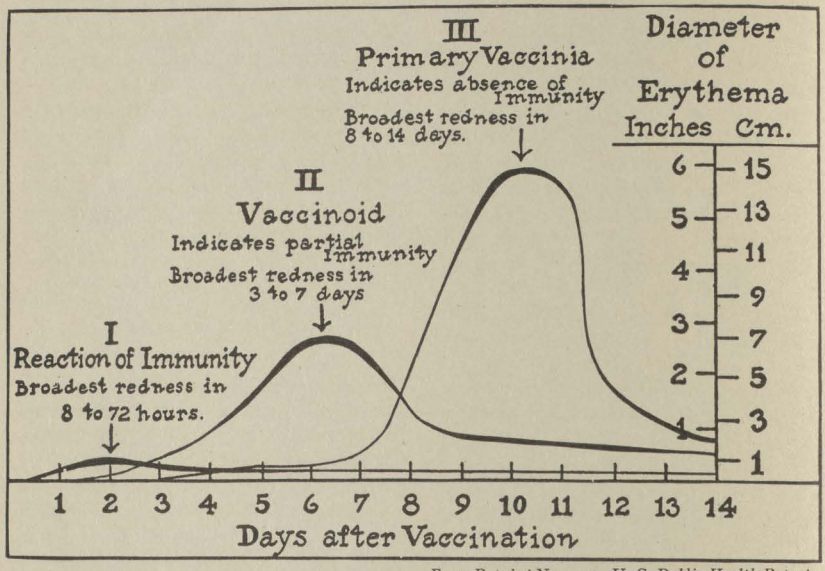
5. *Are any other methods of vaccination and treatment satisfactory?*

Any method is satisfactory which insures that the vaccine is deposited in the deeper layers of the epidermis with no more injury and over no greater an area than by the pressure method (not longer than one-eighth inch or 3 millimeters in any direction), and which avoids poulticing the developing vaccination. With any scarification method, to secure the maximum number of successes possible with the vaccine used, the vaccine should be rubbed in with the side of the scarifier or with a sterile toothpick for at least 15 seconds. Dr. Charles Armstrong has rightly suggested that even after open scarification the vaccine be immediately wiped off following this rubbing in, to avoid softening of the skin or subsequent maceration from the glycerin.

**The four chief points in vaccination are the use of fully potent vaccine, clean technique, restriction of the insertion to a very small area, and insuring the rapid drying of the vesicle.**

6. *Are there any objections to the intradermal injection of diluted smallpox vaccine?*

Yes. It is always deeper and is




*From Reprint No. 1137, U. S. Public Health Reports*

FIG. 4.—THE THREE TYPES OF REACTION FOLLOWING VACCINATION DIFFERENTIATED BY THE DIAMETER OF THE ERYTHEMA*

Type I. *Immune reaction*: This is the reaction in a person who is fully protected against smallpox by previous vaccination or a previous attack of smallpox. The maximum diameter of the erythema is reached in 8 to 72 hours. There is usually no vesicle.

Type II. *Vaccinoid:* This is the reaction in a person who has partially lost the protection gained from a previous vaccination or attack of smallpox. The maximum diameter of the erythema is reached in 3 to 7 days. There is a vesicle at the center of the reaction.

Type III. *Primary vaccinia:* This is the reaction in a person who has never been vaccinated or had smallpox, or who has lost all the protection afforded by a previous vaccination or attack of smallpox. The maximum diameter of the erythema is reached in 8 to 14 days. There is a vesicle at the center of the reaction.

The spreading and receding of the erythema is the essential part of the reaction and the three types of reaction are differentiated from each other by the time at which the greatest diameter is reached. The varying depth of color over the entire red area is indicated on the curves by heavy and light shading. IMMUNITY CAN BE JUDGED FROM THE TYPE OF REACTION ONLY IF VACCINE OF FULL POTENCY WAS USED. Buy vaccine as needed, and keep below freezing if possible.

likely to be more painful than the method of vaccination described above, and in many instances, even in good hands, the injection will be subcutaneous rather than intracutaneous; subcutaneous applications of smallpox vaccine give reactions which are different from ordinary vaccinia and are not to be differentiated from reactions following other injections, so that one is never sure of the potency of the vaccine being used.

*EDITOR'S NOTE. See color exhibits opposite page 14.

7. *How may the various reactions following smallpox vaccination be differentiated?**

By observation 2 days after vaccination and twice later, about 4 and 8 days after vaccination, and by the cooperation of the person vaccinated to observe when the maximum reaction is reached.

With a reaction of immunity which indicates full protection against smallpox, the broadest redness is reached and passed in 8 to 72 hours after vaccination. This redness is accompanied by a slight elevation of the skin, which can be felt by passing the finger lightly over the vaccinated area.

With the accelerated or modified reaction, called vaccinoid, which indicates partial immunity, the broadest redness is reached and passed in 3 to 7 days after vaccination.

With a typical primary vaccination or vaccinia, indicating absence of immunity to smallpox prior to this vaccination, the zone of redness, or areola, rather narrow from the third to the seventh day, begins a sudden spread about 7 days after vaccination and reaches its broadest diameter in 8 to 14 days after vaccination, rapidly disintegrating and disappearing thereafter.

The sharp division of the postvaccinal reaction into these three types is somewhat arbitrary, all gradations being found in practice; differentiation into the three types is based on the time of broadest redness. The more prompt the maximum the higher is the immunity. Vesicles are formed in vaccinoid and typical vaccinia reactions, but not usually with the reaction of immunity. The vesicle of a typical vaccinia, and of many vaccinoid reactions, has a turbid, whitish appearance, but if properly cared for does not become a true pustule, and dries up and heals promptly after the height of the reaction is reached. The characteristic pitted scar is red at first and gradually becomes white. Scars of vaccinoids are much less marked, and reactions of immunity usually leave no scar.

All three of the types are successful vaccinations provided the smallpox vaccine was fresh and strong. (See question 9.) All three not only indicate the grade of the previous immunity, but increase the immunity as well. All other results, where proper technique was used and the individual was in good health (question 16), indicate deficient vaccine. Every vaccination should give a reaction.

8. *What untoward results from vaccination are to be looked for?*

With aseptic technique and a small insertion site which is kept dry and cool, the great majority of vaccinations go through their typical course and heal promptly if the crust is left undisturbed. The freest possible access of air currents and the natural friction of the clothing seem to promote firmness and rapid crust formation in the superficial skin layer of the vesicle. Particular care that all precautions are taken should be exercised in *primary* vaccinations, as Surg. Charles Armstrong has pointed out.

Rarely, due possibly to skin bacteria which cannot be removed by the preliminary cleansing, the vesicle will become purulent and extend beyond its normal diameter, which is not over three-eighths of an inch (10 millimeters) greater than that of the insertion site, the drying up of the vesicle and the fading of the areola being thereby delayed. Opening of the pustule and the temporary application

*EDITOR'S NOTE: See color exhibits opposite page 14.

*Courtesy, Burroughs Wellcome & Co.*

JENNER'S BIRTHPLACE
BERKELEY, ENGLAND

**In this quaint old vicarage was Edward Jenner born, son of the Vicar of Berkeley. Upon the death of his father, six years later, Edward was taken into the family of his eldest brother, the Reverend Stephen Jenner, who brought him up with paternal tenderness.**

of some strong antiseptic, such as mercuric bichloride solution, should be practiced if this takes place. As soon as a fair-sized areola has formed, the maximum immunity against smallpox has been attained, and the use of an antiseptic will not diminish the vaccinal protection.

In general, temporary moist dressings, or single applications of a liquid antiseptic without a dressing, are to be preferred to powders or ointments. Occasionally the vesicle may soften or accidentally rupture, or the crust be knocked off, in which case also temporary dressings may be indicated, but the formation of a firm, unprotected crust should be favored as soon thereafter as possible. For some infants a roomy sleeve fastened to the neck and wrist may be useful to keep out the finger nails.

Accessory vesicles around the vaccination site may in some cases be caused by too vigorous cleansing of the skin prior to vaccination. The vaccine may also be transferred to scratches or other skin lesions, giving rise to distant vesicles.

True generalized vaccinia practically never occurs. Eruptions at about the time of the maximum reaction or later are not at all infrequent. The earlier eruptions are likely to be morbilliform, some simulating the skin lesions of measles very closely. The later eruptions are more like erythema multiforme. These incidental eruptions are not troublesome after their diagnosis is understood, and they disappear promptly without treatment.

The four most common failures in vaccination, from vaccine of insufficient potency, are a total lack of any reaction, a sluggish, imperfect reaction not conforming to any of the three types described in the answer to question 7, an early reaction similar to a reaction of immunity in those who should give a vaccinoid, and the spurious reaction variously known as the keloidal, the mulberry of Seheult, or the paravaccine of Pirquet. This last is a reddish or purplish papule looking somewhat like granulation tissue, rather slow in appearance and often persistent; it gradually disappears without treatment.

To guard against complications use aseptic technique, insertion sites not more than one-eighth of an inch (3 millimeters) in diameter, keep the arm dry and cool, and (in first vaccinations) inspect after 9 to 14 days.

To guard against failures use fresh vaccine that has been kept very cold, and in case of doubt as to potency, vaccinate at more than one site, keep-

ing each site of the minimum size.

9. *How can one tell whether the vaccine used is of full potency?*

A fair test that the vaccine is of full potency is that when properly applied it gives 100 percent of vaccinias (typical primary successes) in every application on at least 100 previously unvaccinated individuals. A more practical test is that it should give more than 50 per cent of vaccinoid reactions in persons who have been vaccinated or have had smallpox over 10 years previously, and immunity reactions or typical vaccinias in the remainder; a much smaller number of individual vaccinations will give a good idea of the potency of a batch of vaccine by this test. The fact that uniformly successful results are obtained in a few previously unvaccinated individuals is not sufficient evidence of full potency.

10. *How cold should smallpox vaccine be kept?*

The colder the better; well below freezing if possible. Icebox refrigeration is not cold enough for this purpose. Smallpox vaccine, formerly called vaccine virus, cannot be injured by freezing, as can serums and other vaccines. Even a whole day out of cold storage, in addition to the necessary transportation from the manufacturing laboratory, may produce detectable loss of potency.

Smallpox vaccine which has been out of cold storage so that it gives only about 80 per cent or 90 per cent of successful vaccinations on previously unvaccinated individuals may be satisfactory in ordinary outbreaks of smallpox or in routine vaccinations, but in the presence of severe smallpox or when reactions of immunity are to be observed the vaccine should be obtained direct from the manufacturer and kept below freezing.

In an electric refrigerator the smallpox vaccine should be kept in an ice-making compartment. Next best to storage below freezing is placing the vaccine in a metal or glass container which presses against a block of ice. If a vacuum bottle is used for transporting smallpox vaccine the inside of the bottle should be packed with ice around the vaccine. Fortunately, severe outbreaks of smallpox tend to occur in cool weather, and cause sufficient demand for the vaccine so that it is shipped very directly from the manufacturing laboratories and is used rapidly.

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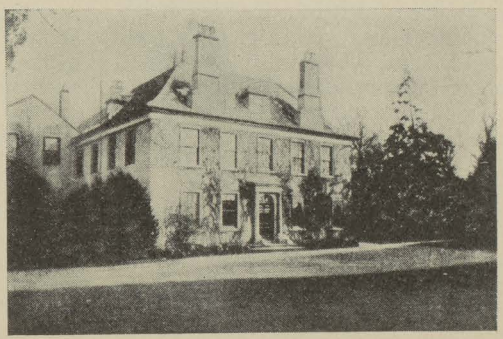
CHANTRY COTTAGE,
BERKELEY, ENGLAND

Where Jenner lived and died, scene of most of his great work and heart-breaking discouragements. Back of the thick screen of evergreens is a small rustic apartment, of which it has been said: "Here, in this humble fane, more wonders were wrought than in all the splendid temples of Æsculapius."



*Courtesy, Burroughs Wellcome & Co.*

In the presence of severe smallpox, when there is uncertainty as to the potency of the vaccine, vaccination should be performed at more than one site, at least an inch apart, preferably with vaccine from different sources. Batches differ in their keeping qualities, but in recent years smallpox vaccine has with uniformity been found to be satisfactory as it leaves the manufacturer.

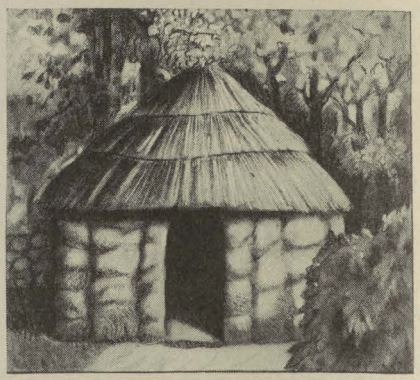
11. *Does a red, slightly raised area, observed at the site of vaccination* 48 *hours after vaccination is performed, necessarily indicate that the person vaccinated was immune to smallpox?*

No; there are three other possibilities:

(*a*) The most frequent of these is that the vaccine used had been weakened by time or temperature, so that, while still able to give the reaction described above, it did not go on to the production of a more marked reaction (vaccinoid), as would a vaccine of full strength if used on the same person. Ordinary ice-box refrigeration is not cold enough for the storage of smallpox vaccine which is to be used in testing immunity.

(*b*) Vaccinoid reactions usually give at early inspection (second day) the appearance described above, which is similar to that of a reaction of immunity. Thus, even if an early reaction is seen, subsequent observations, about the fourth and eighth days, are necessary to determine whether the reaction was that of immunity, with its maximum diameter of redness reached in less than 3 days, or a vaccinoid or vaccinia, with later maximum. Even a vaccinoid reaction, however, indicates some immunity. Some true vaccinias may show an early reaction, especially if there have been previous unsuccessful attempts at vaccination. Early reactions are more clearly apparent with the multiple pressure method than with other non-injection methods on account of the absence of injury to the true skin and the consequent absence of an obscuring traumatic reaction. Temperature changes, skin irritation, and other conditions may cause fluctuations in the diameter of the reaction, and there may even be an almost entire subsidence, giving rise to two maxima. In this case the later maximum indicates the true character of the reaction. The only safe rule for determining which of the three types of reaction occurred is repeated observation and measurement of diameters, as explained in answer to question 7.

(*c*) The trauma due to the mere mechanical act of vaccination may cause enough irritation so that the redness persists at the time of the early 48-hour observation, independently of any specific reaction. To obviate falsely reading such redness as a reaction of immunity, it is neces-



*Courtesy, Dr. H. M. Guilford and Wisconsin Med Jour.)*

JENNER'S TEMPLE

**This is the rustic outbuilding referred to on page 11 in connection with the picture of Chantry Cottage. It witnessed Jenner's earliest and best work**

sary either to treat another site as a control, with exactly the same degree of trauma but without applying the vaccine, or, preferably, to use a method such as the "multiple pressure," which leaves no traumatic reaction after 6 hours to obscure faint reactions of immunity.

An early reaction can be called a true reaction of immunity only when pure smallpox vaccine has been used and these three other possibilities have been eliminated.

12. *In the reaction of immunity is the grade of immunity indicated by the amount of the reaction?*

No. The *time* after vaccination within which the local area of redness and infiltration of the skin reaches its maximum and begins to subside, and not the amount of this redness and infiltration, is the index of immunity. The quicker the maximum is reached and passed the higher is the degree of immunity indicated. The *amount* of the reaction depends on the skin reactivity of the person vaccinated, and not on the grade of immunity. It is probable that any reaction which is marked within 24 hours will reach its maximum in less than 72 hours, and therefore would constitute an immune reaction, but some of the most highly immune persons give the smallest reactions.

13. *May not the reaction of immunity be an ordinary protein reaction, such as is given, for example, by pollen proteins?*

The protein reactions as shown by the usual skin tests (not subcutaneous) have an altogether different time relation from that of the reaction of immunity to smallpox. The former are rapid, appearing and reaching their maximum within about one-half hour, while the reaction of immunity to smallpox reaches its maximum in not less than 8 hours after vaccination, and usually in more than 24 hours after vaccination. The protein reaction has faded before the reaction of immunity has begun to appear.

14. *How often should one be vaccinated against smallpox?*

Ordinarily once in every 5 to 10 years, so that a maximum protection is maintained without the inconvenience at any time of a reaction more severe than the immunity reaction, except for the original primary vaccinia. Vaccination of infants is attended with less general reaction and fewer complications than vaccination of older children, so that vaccination is advisable as soon after birth as practicable, preferably before teething. Winter and spring are more suitable seasons than the warmer parts of the year, but tight-fitting clothing should never be worn over the vaccinated area.

Though young babies often require a more potent vaccine than others to insure a successful effect, there are four advantages to be gained by vaccinating a child during infancy rather than waiting until later; first, the "take" is apt to be milder and freer from the dangers of complications, such as tetanus; infantile vaccination usually gives rise to no inconvenience whatever; second, it tends to make the secondary vaccination, required at school age, a much milder affair than if the school vaccination were primary; third, protection against smallpox is gained for the preschool runabout years; fourth, the scar of an infantile vaccination fades more completely than scars of primary vaccinations performed later.

Provided the subsequent revaccinations result in mild vaccinoids or

immune reactions, as may be expected, one thereby secures lifelong complete protection against smallpox without any severe reaction at any time and with only a single inconspicuous scar.

Immunity afforded by vaccination is lost by different individuals at different rates. The ability to ward off an attack of smallpox may be compared to proficiency in a foreign language. Such proficiency may be first acquired during early life and lost gradually, more rapidly in some individuals than in others. Some individuals need to be vaccinated more often than once in 5 years to maintain full protection and always to secure as the result of such vaccination merely an immunity reaction. Others may be vaccinated less frequently than once in 20 years and still maintain high immunity. A marked vaccinoid reaction indicates that too long a time has been allowed to elapse since the last vaccination with potent vaccine.

*Courtesy, Burroughs, Wellcome & Co.*

JENNER'S SEVEN LANCETS AND TWO SCARIFIERS

It is a good plan to be revaccinated whenever one can be assured of a fully potent vaccine being used, so that the resulting reaction can be interpreted with certainty as showing a definite grade of immunity. On the basis of such a reaction, with the knowledge of the individual's previous vaccination history, one can often advise as to how frequently in the future that individual should be revaccinated.

The chance of taking the disease varies with the intensity of exposure and with the severity of the strain of smallpox to which one is exposed, as well as with the individual susceptibility. Those health officers who are continually exposed may need more frequent vaccination than the public at large. There is some evidence to show that infants and members of the colored races tend to lose their immunity more rapidly than others, also that high immunity is preserved for a somewhat longer time after a revaccination than after a primary vaccination.

A primary vaccination with one successful revaccination, or even a single successful vaccination, will as a rule protect throughout life from the milder forms of smallpox, but this is far from being true in the severer outbreaks. Second attacks of smallpox are rare, but do occur. If there is danger of exposure to a severe form of smallpox all persons who have not been vaccinated within one year successfully, that is, with vaccine known to be of full potency, should be vaccinated.

15. *Does the degree or length of immunity following vaccination depend on the size or number of scars?*

To some slight extent, but not enough to make it worth while to undergo the inconvenience, the retardation of healing, and the risk of infection from a vaccination insertion larger than the smallest one which will insure success. Immunity de-

# THESE COLOR EXHIBITS

IT IS not generally known that there are, in the possession of the United States Public Health Service, a collection of twenty-one life like models of arms showing the actual appearance of typical reactions to smallpox vaccination.

Were they more generally known to physicians and laymen, there would follow a better understanding of the rationale of vaccination and consequently less opposition to it. Unfortunately it has been impossible to make a practice of transporting these fragile models for teaching purposes.

Second only to the models themselves, for demonstration use, are faithful colored reproductions, but as no funds were available for this purpose, it occurred to us that a worthy public cause could be served by assuming the expense of making and disseminating these color plates from the wax models.

To this end we enjoyed the splendid cooperation of the Surgeon-General of the United States Public Health Service, and we now take pleasure in presenting the results of this effort.

It is our earnest hope that the reference value of these color exhibits will be widely used for both visual differential diagnostic as well as teaching purposes, and that they will also lead the reader to permanently file the entire booklet. For the text matter is likewise important in the wholesale and wholesome broadcasting of the true facts concerning vaccination.

Johnson & Johnson
NEW BRUNSWICK, N. J., U.S.A.

In order to reproduce the reaction area actual size, only the local site is here shown.

## PRIMARY VACCINIA—Indicating No Immunity Against Smallpox Prior to Vaccination. Broadest Redness 8 to 14 days

I Immediately After Vaccination

II One Hour After Vaccination

III Two Days After Vaccination

IV Four Days After Vaccination

V One Week After Vaccination

VI Nine Days After Vaccination

VII Two Weeks After Vaccination

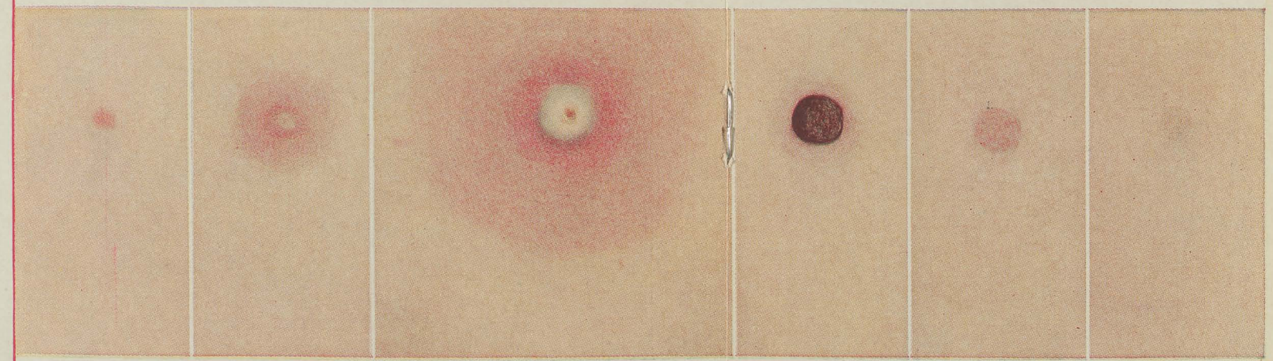
VIII Three Weeks After Vaccination

IX Two Months After Vaccination

X One Year After Vaccination

XI Two Years After Vaccination

## VACCINOID—Indicating Partial Immunity Against Smallpox. Broadest Redness, 3 to 7 Days.



A Two Days After Vaccination

B Four Days After Vaccination

C One Week After Vaccination

D Nine Days After Vaccination

E Three Weeks After Vaccination

F One Year After Vaccination

### The Three Types of Reaction Following Smallpox Vaccination by Multiple Pressure Method

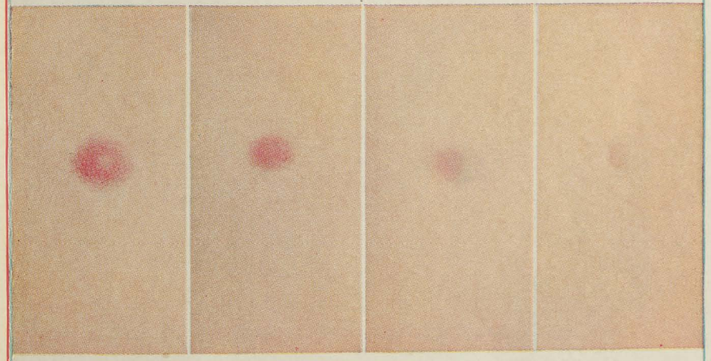
**Begin with top row; read captions beneath each exhibit; for detailed descriptions, turn over**

Whether the individual physician prefers the multiple pressure method to puncture or scarification is of comparatively minor importance. The paramount factors demanding careful attention are: (1) Use of fresh, potent vaccine, stored below freezing temperature. (2) Observation of asepsis. (3) Restriction of insertion to very small area (4) Maintenance of site in clean, dry and cool condition till scab falls off.

By Checking With These Exhibits, You Can Both IMMUNIZE and TEST IMMUNITY

Copyright, 1928, Johnson & Johnson

## IMMUNITY-Indicating Complete Protection. Broadest Redness, 8 to 72 Hrs



1 Two Days After Vaccination

2 Four Days After Vaccination

3 Nine Days After Vaccination

4 Three Weeks After Vaccination

# KEY TO DIFFERENTIAL DIAGNOSIS OF VACCINIA, VACCINOID AND IMMUNE REACTIONS TO SMALLPOX VACCINATION

*Top Row.* PRIMARY VACCINIA reactions, actual size. Indicating no immunity against smallpox prior to vaccination. Maximum diameter of erythema in 8 to 14 days.

I. Immediately after vaccination. Nothing is visible except the depressions made by the side of the needle point pressing on the skin. The entire vaccination area is less than one-eighth inch in diameter.

II. One hour after vaccination. A very faint redness may last for about one hour after vaccination.

III. Two days after vaccination. Vaccinia in a person never vaccinated before. All signs of the vaccination have disappeared. (Sometimes appearance is like Exhibit A, Vaccinoid).

IV. Four days after vaccination. Vaccinia. The reaction has begun and there may be a beginning vesicle.

V. Seven days after vaccination. Vaccinia. There is a well-formed vesicle with a narrow red zone around it.

VI. Nine days after vaccination. Vaccinia. The height of the reaction has just about been reached. The sudden spread of the areola from the seventh day is the most characteristic part of the reaction of vaccinia.

VII. Fourteen days after vaccination. Vaccinia. The reaction has passed its height. The areola has faded as suddenly as it grew, and the vesicle has nearly all dried to a crust.

VIII. Twenty-one days after vaccination. Vaccinia. The crust or scab, if it has been left undisturbed, is almost ready to fall off.

IX. Two months after vaccination. Vaccinia. The crust or scab remained on long enough, and was allowed to dry completely without interference. So that after it came off, some weeks ago, a perfect red scar remains.

X. One year after vaccination. Vaccinia. The scar is usually pink and has contracted slightly but always remains larger than the original site immediately after vaccination.

XI. Two years after the vaccination of a person who had never been vaccinated before, the scar of vaccinia has usually become white and pitted. If the vaccination has been properly performed and cared for, it is far from being a disfigurement, but rather a "sanitary dimple."

*Bottom Row, left.* VACCINOID reactions, actual size. Indicating partial immunity against smallpox. Maximum diameter of erythema in 4 to 7 days. (Vaccinoid reactions immediately after and one hour after vaccination, same appearance as I and II Primary Vaccinia.)

A. Two days after vaccination. Vaccinoid, in a person previously vaccinated but who had lost most of his protection. The place has become red and can be felt with one's finger tip.

B. Four days after vaccination. Vaccinoid. (Vaccinated too long ago for full protection). The reaction has increased and there is a distinct vesicle.

C. Seven days after vaccination. Vaccinoid. The reaction has reached or passed its height as shown by the diameter of the red areola around the vesicle. This particular vaccinoid reaction indicates very little previous immunity. Other vaccinoids sometimes have their maxima in about 4 days, indicating immunity about as high as that shown by a true reaction of immunity.

D. Nine days after vaccination. Vaccinoid. The areola has faded markedly and a scab has formed over the drying vesicle.

E. Twenty-one days after vaccination. Vaccinoid. The crust has come off late enough so that a perfectly healed red scar remains.

F. One year after vaccination. Vaccinoid. Although the reaction at its height looked as inflamed as a vaccinia and had nearly as large a vesicle, the scar frequently disappears so that it cannot be found after a year, while the large white scars of the older vaccination remain permanently.

*Bottom Row, right.* IMMUNE reactions, actual size. Indicating complete protection against smallpox. Maximum diameter of erythema in 8 to 72 hours. (Immune reactions immediately after and one hour after vaccination, same appearance as I and II Primary Vaccinia.)

1. Two days after vaccination. (Also seen with weak virus in non-immunes). Reaction of immunity in a person still protected by previous vaccination. A distinct redness with some elevation is seen, and itching is usually present.

2. Four days after vaccination. Reaction of immunity (fully protected by previous vaccination). The reaction has begun to fade.

3. Nine days after vaccination. Reaction of immunity. Only a little evidence of the vaccination remains.

4. Twenty-one days after vaccination. Reaction of immunity. Nearly all trace of the reaction has disappeared.

**¶ If the vaccine is weak, varying reactions which look like reactions of immunity may occur in unprotected persons. ¶ If the vaccine is fully potent and the technique is adequate, *every* vaccination should give one of these three reactions. ¶ The degree of previous protection is determined, not by the amount of the reaction on any day, but by the time of the maximum. All three reactions produce immunity. See also type matter on reverse side.**

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pends much more on the recency of vaccination with potent vaccine than on the size or number of vaccinations at any one time. See answers to question 8 (last paragraph) and question 10.

16. *What are the contraindications to vaccination?*

In general, skin diseases, particularly eczema, are the only conditions which will justify school attendance and at the same time be contraindications to routine vaccination. This is on account of the danger of diffuse vaccinia from carrying the vaccine into the open lesions of the skin disease, or the danger of contaminating the vaccination site if the skin lesions are purulent.

Patients with such diseases as tuberculosis are in no wise harmed by properly performed vaccination.

Acute infectious diseases may cause a vaccination "take" to be delayed or atypical, but are not in themselves contraindications in case of possible exposure to smallpox.

There is a curious relation in leprosy which tends to cause the lighting up of leprous lesions during the course of the vaccination, but which may promote more rapid healing thereafter.

Serious lymphomatous diseases, including lymphatic leukemia, may be made worse by vaccination.

Neither pregnancy nor any age, from 1 hour to over 100 years, is a contraindication to vaccination if smallpox is in the community.

17. *Will a nonimmunized person contract smallpox if exposed to the disease?*

By no means uniformly. Exposure to smallpox, especially to the milder forms, without contracting the disease frequently occurs and is no definite evidence of immunity. The number of cases of smallpox among the unprotected persons in contact with patients suffering from the disease is very much less than 100 per cent.

18. *Does the failure of a vaccination to "take" indicate protection?*

No. Differences in skin receptivity may occur independently of the condition of the individual as regards true immunity. For example, very young infants are not as easily vaccinated with success as are older children, yet they are susceptible to smallpox, and when successfully vaccinated give a typical vaccinia. Some individuals may be resistant, in the same way, to a "lot" of vaccine which gives success generally in other individuals, but are not immune against smallpox when exposed, nor against vaccination when a fully potent lot of vaccine is used.

19. *How long after exposure to smallpox is it worth while to be vaccinated in order to hope that the attack may be warded off?*

In some smallpox hospitals every person is vaccinated on admission, to guard against the danger from exposure to the disease in case of error in diagnosis. Successful vaccination performed on the day of exposure will almost always give complete protection against the smallpox attack, and vaccination up to a few days before the onset at least makes the attack milder than it would otherwise have been. Vaccination during the few days before onset will allow the vaccination and smallpox eruption to develop simultaneously without either influencing the other.

The full, successful development of a vaccination performed after the

eruption has appeared is commonly held to be incompatible with the diagnosis of smallpox. Vaccination may, however, rarely appear to be fully successful if performed as late as the fourth day of the eruption, and it is astonishing how soon after smallpox or vaccination some exceptional individuals lose their immunity.

Three circumstances may cause confusion in regard to coincident smallpox and vaccinia: A vaccination performed in good time to prevent the smallpox attack may have been done with vaccine somewhat under full potency, and development of the typical vaccinia may be abnormally delayed until stirred up by the oncoming smallpox; or the vaccine may have been entirely impotent and the developing eruption of variola may appear first at the irritated vaccination site, simulating true vaccinia. A late vaccination may in the same way result in a localized variolous patch at the vaccination site, or the late vaccination may give a modified or immune reaction due to the increasing smallpox immunity.

The discussion given above applies to primary vaccination. If the individual has some immunity from a previous vaccination the secondary vaccination may be protective though performed at a somewhat longer period after exposure.

20. *What are the most important points in the diagnosis of smallpox?*

The diagnosis of smallpox may in some cases be difficult for the most experienced, but in order of their importance the most important diagnostic points are the distribution of the eruption, the individual lesions, the course of the disease, and inoculation tests. Of these four points the first two are of especial value because they are immediately available at first inspection of the patient.

On account of its contagiousness smallpox should be diagnosed as promptly and as certainly as possible. The characteristics of the distribution are the most uniformly valuable of all the criteria of diagnosis, and are useful at almost any stage and in almost any case. Even in the mildest cases, with only a very few lesions, a count of the number on each part of the skin surface will usually give the clew to the correct diagnosis. It is to be remembered, however, that smallpox is a general disease, and that the eruption is symmetrical and not local.

The usual *distribution* of the smallpox eruption, general and in detail, and the character of the individual *lesion,* are shown by the table on page 17 (modified from T. F. Ricketts) of differences between the smallpox eruption and the chickenpox eruption.

This tabular description applies solely to the lesions of the characteristic eruption of smallpox, which go through the stages of papule, vesicle, pustule, crust, and scar, and not to the early rashes, erythematous or purpuric, which are seen rarely during the febrile stage preceding the real smallpox eruption, and which may in the most severe toxic cases constitute the only eruption prior to death.

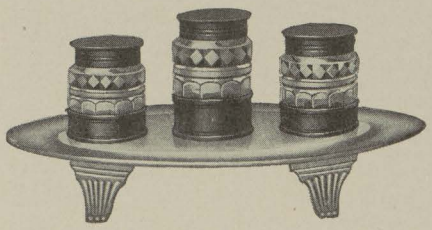
Any case of purpura or hemorrhage with fever is likely to be smallpox and should be so considered as regards isolation, and immediate vaccination of "contacts," until another diagnosis is clear. Otherwise, presumptive diagnosis, before the characteristic eruption, can be made only in case of an acute febrile onset about 12 days after known or possible exposure to smallpox.

In very severe cases or in debilitation from any other cause the lesions of the true smallpox eruption are often imperfectly filled out.

DIFFERENTIAL DIAGNOSIS, SMALLPOX AND CHICKEN POX ERUPTIONS

| SMALLPOX | CHICKEN POX |
|---|---|
| *(a)* Favors prominences, extensor surfaces, and surfaces exposed to irritation; tends to avoid protected surfaces, flexures, and depressions. | *(a)* Is distributed indifferently in general, though not infrequently the eruption is especially thick over some particular area of the skin where there has been irritation. |
| *(b)* The forearms and wrists have a thicker eruption than the upper arms. | *(b)* The proximal part of the limbs have more of the eruption than the distal. |
| *(c)* Most abundant on face, most scanty on abdomen and chest. | *(c)* The abdomen and chest are covered as thickly as the face, or more thickly. |
| *(d)* More abundant on the back than on the abdomen. | *(d)* The abdomen has as many lesions as the back. |
| *(e)* More abundant on the shoulders than across the loins, and on the chest than on the abdomen. | *(e)* The distribution is indifferent as regards these regions. |
| *(f)* The eruption favors the limbs and generally the arms, next to the face. | *(f)* Tends to avoid the limbs. |
| *(g)* Except when modified naturally or by previous vaccination, the lesions are deep-seated and have an infiltrated base. | *(g)* Unless they have become infected, the solitary lesions on the more protected parts of the body are superficial and the base is not infiltrated, so that the entire lesion tends to collapse on pressure. |
| *(h)* The solitary lesions on the more protected parts of the body are generally circular in outline. | *(h)* The lesions frequently have an irregular outline; when they lie near a flexure they are apt to be oval or elongated. |
| *(i)* The lesions tend to be all of the same sort at the same time, or if they are different, the smaller the lesion and the nearer it lies to the face the more advanced in development it should appear to be. In cases of modified smallpox the lesions are likely to vary greatly in size. | *(i)* Lesions in various stages of development may be found simultaneously, irrespective of their location or size. |

The *course* of the disease, with the gradual but continuous progress of each individual lesion, is perhaps the most definite criterion in smallpox diagnosis, but unfortunately requires prolonged observation. The incubation period from effective exposure to onset is usually 8 to 18 days, tending to be longer with the milder strains. There are 1 to 5 days of febrile symptoms before the eruption, making the total time from exposure to the beginning of the eruption about 14 days. The typical lesion is papular for 1 to 4 days, vesicular for 1 to 4 days, pustular for 2 to 6 days, and the crust which then forms falls off 10 to 40 days after the first sign of the lesion, leaving a red, finely pitted scar, which very gradually becomes white during the ensuing months or years. Lesions appear first on the more exposed or irritated surfaces, as the forehead, face, and hands, and usually appear last on the lower extremities, perhaps several days later.



JENNER'S INKSTAND

For many years, it was reverently used by our own beloved Weir Mitchell.

In general, the more severe the case the slower the progress of the lesions, while mild cases may go through their course rapidly and leave practically no scars.

The *inoculation* of a rabbit's cornea with the contents of the vesicles or pustules, followed by enucleation of the eyeball 40 to 72 hours after inoculation, fixation in strong sublimate alcohol, and examination for the characteristic whitish papules and the microscopic Guarnieri bodies in the corneal tissue (Paul's test), is the most useful laboratory precedure in the diagnosis of smallpox. This also consumes valuable time, and furthermore has an element of uncertainty on the dangerous side; that is, the atypical cases of smallpox (atypical by reason of the stage at which they are seen, or by reason of their modified character) are likely to give negative Paul reactions, causing a dangerous implication of security.

Though smallpox is unquestionably many times more frequent in the unvaccinated than in those who have had even a single vaccination, it is believed that neither the vaccination history nor the presence of scars should be given diagnostic weight. The unreliability of such a criterion is especially evident in virulent outbreaks of the disease.

21. *What effect does previous vaccination have on smallpox?*

If recent, successful vaccination will protect against the disease entirely. See answers to questions 4, 7, 11, 14, 19, and 23.

If the protection is not quite complete, on account of the vaccination having been performed too long before, the toxic early stages of the disease are the first to come out from under protection, and the resulting illness may have a fairly severe febrile onset for two or three days, though the following eruption be scanty and the indisposition trivial.

The purpuric, uniformly fatal, form of smallpox is the most difficult to prevent by vaccination, and cases of this form, without a true smallpox eruption, may occur in persons with a fairly good vaccination history. The incidence of cases of this form depends on three factors—inherited predisposition, severity of the strain of smallpox, and immune status (remoteness of last vaccination).

If the protection is even less in degree, insufficient to cause much reduction in the number of the smallpox lesions, the individual lesions themselves may still be modified by the vaccination of long before, so that they are smaller or more diverse in size, and more superficial, with a resulting lessened severity.

As a result of all these modifications in susceptibility to attack, in number of lesions, and in the character of the lesions, vaccination lowers the death rate from the severe disease per 100,000 population even more than it lowers the incidence rate.

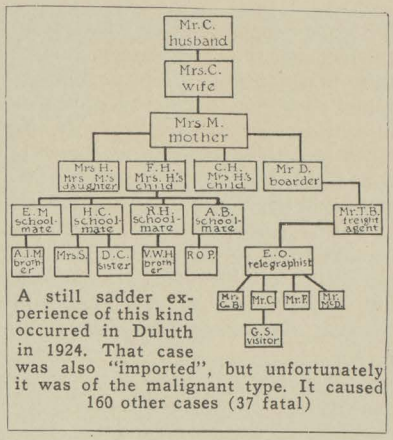
22. *Is there another contagious eruptive disease, intermediate between smallpox and chicken pox in severity (variously called alastrim, milk pox, amaas, or varioloid varicella), which*

*might be mistaken for either of these two diseases?*

No. Outbreaks of smallpox occur of all grades of severity, some with a mortality of 70 per cent among those attacked and some with a mortality of 0.01 per cent. Since 1896 a mild form has been increasingly prevalent in the United States and countries in communication with the United States, having a fatality of about 0.1 per cent among the unvaccinated. The strains of the disease present just previously had been much more severe, and from time to time outbreaks are now occurring with a fatality rate of about 30 per cent in the unvaccinated. Each of these strains in general breeds true to its respective type, and mild cases contracted from severe give rise in turn to severe and fatal cases. There is no definite grade of severity or of fatality that we can consider characteristic of smallpox, and it is probable that almost all of the epidemics called "alastrim," etc., have been mild forms of smallpox.

All forms of smallpox immunize against each other and all may be prevented by the same vaccination.

Exposure to a severe form is much more likely to give rise to infection than exposure to a mild form, and it takes a higher grade of vaccinal immunity (more recent vaccination) to protect against a severe strain than against a mild strain. In moderately well vaccinated communities, such as Germany, epidemics of mild type are entirely prevented and outbreaks of severe type much diminished. On the other hand, in poorly vaccinated communities, where isolation is nevertheless practiced, such as the greater part of the United States and England, mild strains spread more diffusely than severe because they are not taken so seriously by those attacked nor by the public at large, and because the attack is not severe enough to keep the patient in bed and isolated.




A still sadder experience of this kind occurred in Duluth in 1924. That case was also "imported", but unfortunately it was of the malignant type. It caused 160 other cases (37 fatal)

*From "Is Smallpox Vaccination Worth While?"* NOTES AND ABSTRACTS, *11:141.*

HOW ONE "IMPORTED" CASE OF SMALLPOX RESULTED IN 22 MORE ALL UNVACCINATED. NYACK, 1925

The mildness of the form of smallpox commonest at present is one reason for endeavoring to make preventive vaccination as harmless and as mild as possible.

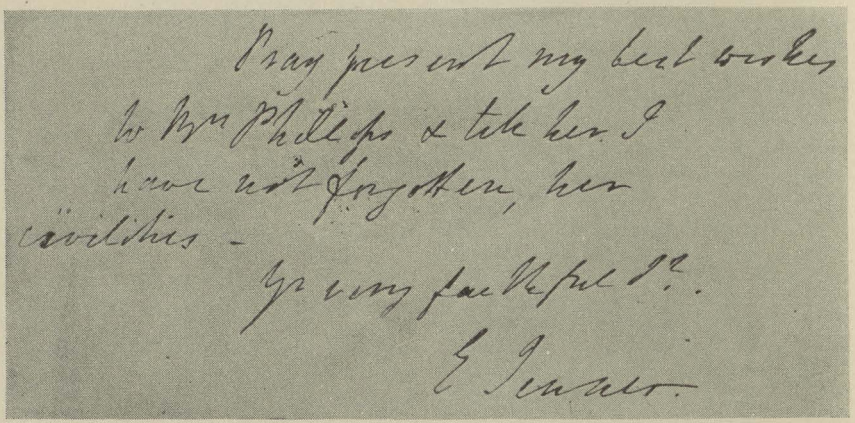
23. *Is vaccination alone a sufficient weapon for fighting smallpox?*

No. Prompt recognition and rigid isolation of the cases, as well as the tracing out of "contacts," should also be carried out to stop the spread unless the outbreak is very mild and in thinly settled regions.

Cases, and even fatalities, occur in every severe epidemic among persons who were vaccinated in good time but with vaccine found, too late, to be of insufficient potency; such cases and fatalities also occur among persons thought to be protected by successful vaccination performed years previous-

ly. Upon reconsideration apart from the fact that smallpox was contracted, this presumption of protection is found to be based upon mistaken or ill-considered evidence. Probably the most infective stage of smallpox is the early stage, when lesions are present in the mouth, nose, and throat. "Return" cases, that is, cases contracted from other patients released too early from hospitals, are unusual, but the crusts are infectious, and patients should not be discharged from isolation until the skin, including the soles of the feet, is free from the primary crusts of the eruption. This may be within three weeks after the onset. The infection may be passively carried by inanimate or animate objects which have been contaminated from cases of the disease, but such passive infectivity is of brief duration.

Epidemics cannot be stopped by isolation without vaccination, nor prevented without required vaccination.



CLOSING PARAGRAPH OF A LETTER IN WHICH JENNER HAD REFERRED TO SMALLPOX AS "THE SPECKLED MONSTER."


## ACKNOWLEDGMENTS AND STATEMENT OF PURPOSE

The text matter of this Bulletin is taken from Reprint No. 1137, United States Public Health Reports.

The color exhibits were specially made by us from the original wax models in the possession of the United States Public Health Service, as detailed opposite page 14. This is the first time these reproductions have been made or disseminated.

We have no vaccine or other biologicals for sale, but in the general interest of preventive medicine, we are happy to publish and distribute several hundred thousand copies of this Bulletin.

We esteem it both a privilege and an opportunity, fortunately placed as we are on one side of a triangle of which the medical profession and the public form the other sides, to be able to proffer this service in an acceptable manner. We believe in smallpox vaccination.

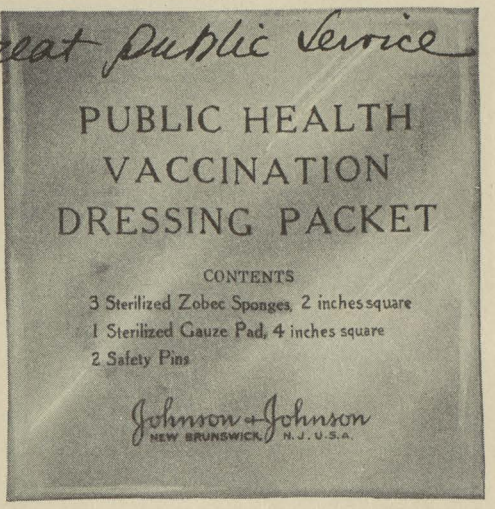
Johnson & Johnson
NEW BRUNSWICK, N. J., U.S.A.

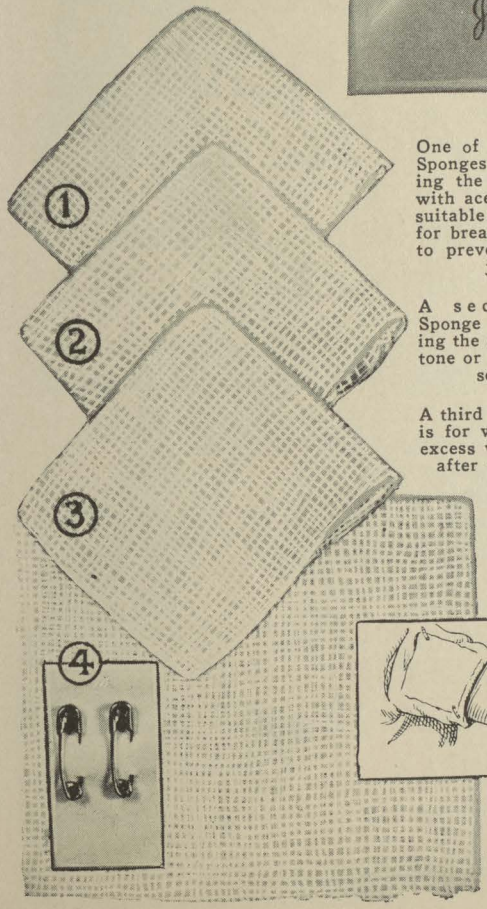
. . . a Great Public Service

This is the opinion of authorities who have examined the *new*

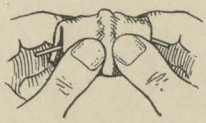
## Public Health Vaccination Dressing Packet

It is the most satisfactory dressing yet offered, because it is light, porous, aseptic, absorbent, and exerts neither constriction nor pressure.



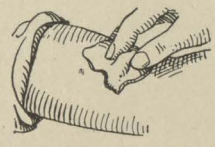



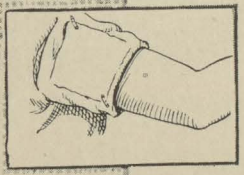

One of the 2" Zobec Sponges is for cleansing the vaccine tube with acetone or other suitable solution, and for breaking the tube to prevent finger injuries.



A second Zobec Sponge is for cleansing the area with acetone or other suitable solution.

A third Zobec Sponge is for wiping off the excess vaccine lymph after vaccination.





The 4 inch square Sterilized Gauze Pad is pinned with the two small safety pins to the inner side of the sleeve of the underclothing, waist, shirt or coat.

**In lieu of safety pins, the protective pad may be attached to the sleeve with DUO LIQUID ADHESIVE.**

*(See pages 22 and 23)*

BOIL AFTER SURGICAL TREATMENT
DUO LIQUID ADHESIVE APPLIED NEAR WOUND WITH A SWAB
LINT OR GAUZE DRESSING IN PLACE OVER WOUND

*Applied with a Swab!*

# Duo Liquid Adhesive

## For Neat Sightly Dressings
## Quick to Put On.... Easy to Take Off

*Not affected by secretions, temperature or climate. No special preparation of field required*

CASES WHICH MAY BE DRESSED WITH DUO:

BOILS · CARBUNCLES · FELONS · ABCESSES · MASTOIDS *VACCINATIONS · GLAND EXCISIONS · ALL MINOR WOUNDS, PARTICULARLY OF THE FACE, NECK, SCALP, FINGERS, HANDS, ARMS, TOES AND FEET

*In vaccination, applied to sleeve; see page 21.

*How Supplied:* (1) Duo Liquid Adhesive, 2 oz. bottles, list price 50c. (2) Duo Liquid Adhesive Kit *(including assorted dressings)* list price $1.00.

FREE *Miniature Duo Liquid Adhesive Kit* FREE
SAMPLE OFFER

Johnson & Johnson
NEW BRUNSWICK N. J., U. S. A.

ADHESIVE DRESSINGS *Without Straps*

DRUGGISTS AND DEALERS WILL ORDER ANY J & J PRODUCT UPON PHYSICIANS' REQUESTS

*Applied with a Swab!*

ADHESIVE DRESSINGS WITHOUT STRAPS

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**Quick To Put On .... Easy to Take Off**

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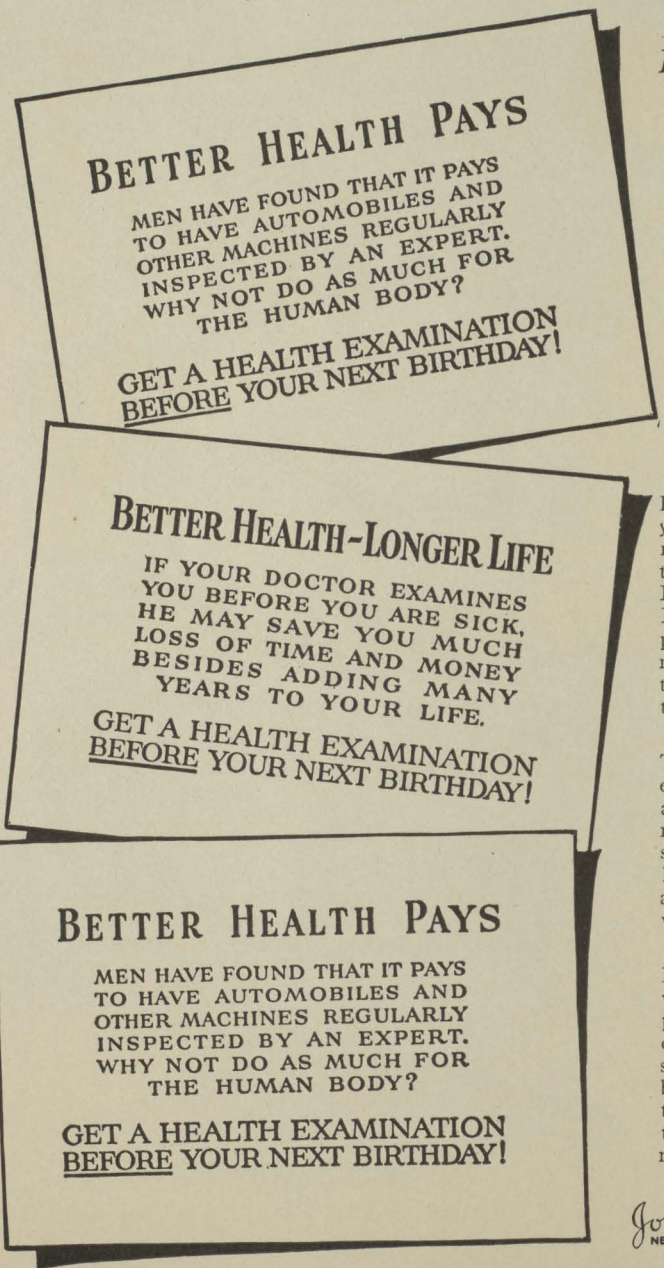
**Sample on request**

DRUGGISTS AND DEALERS WILL ORDER ANY J & J PRODUCT UPON PHYSICIANS' REQUESTS

# *Twenty Million Times A Year*


BETTER HEALTH PAYS
MEN HAVE FOUND THAT IT PAYS TO HAVE AUTOMOBILES AND OTHER MACHINES REGULARLY INSPECTED BY AN EXPERT. WHY NOT DO AS MUCH FOR THE HUMAN BODY?
GET A HEALTH EXAMINATION BEFORE YOUR NEXT BIRTHDAY!
BETTER HEALTH-LONGER LIFE
IF YOUR DOCTOR EXAMINES YOU BEFORE YOU ARE SICK, HE MAY SAVE YOU MUCH LOSS OF TIME AND MONEY BESIDES ADDING MANY YEARS TO YOUR LIFE.
GET A HEALTH EXAMINATION BEFORE YOUR NEXT BIRTHDAY!
BETTER HEALTH PAYS
MEN HAVE FOUND THAT IT PAYS TO HAVE AUTOMOBILES AND OTHER MACHINES REGULARLY INSPECTED BY AN EXPERT. WHY NOT DO AS MUCH FOR THE HUMAN BODY?
GET A HEALTH EXAMINATION BEFORE YOUR NEXT BIRTHDAY!

## *Reiterating the Preventive Medicine Idea to the Public*

It is now over two years since we commenced enclosing these "Better Health — Longer Life" cards with packages of J & J merchandise going to laymen all over the world.

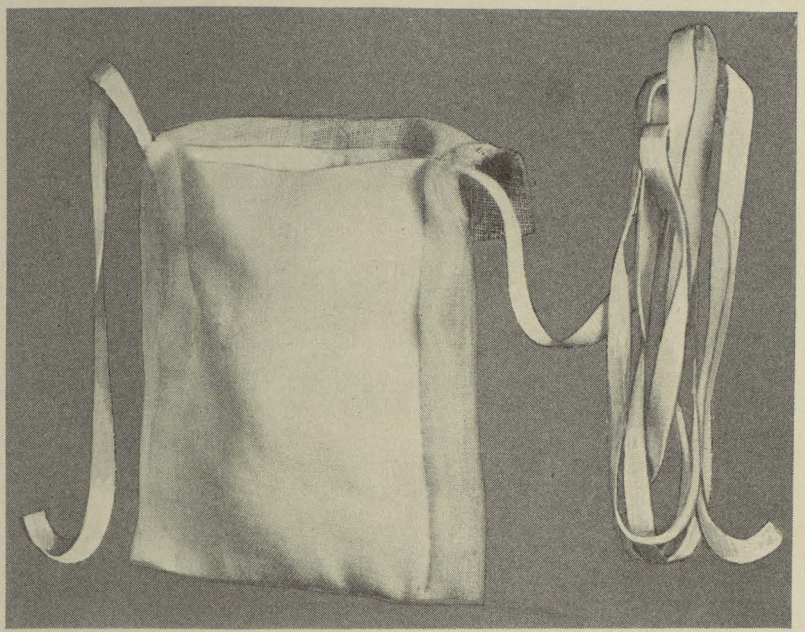
The periodic health examination, like any other human need, has to be sold to the public, and modern advertising provides the means.

It is fortunate that we are able to proffer our share of this advertising service without embarrassment either to the cause or to the tenets of the medical profession.

Johnson & Johnson
NEW BRUNSWICK, N. J., U.S.A.

DRUGGISTS AND DEALERS WILL ORDER ANY J & J PRODUCT UPON PHYSICIANS' REQUESTS

# Sanitary Bags for G. C. Cases



This well-made but inexpensive dressing has recently been improved by the addition of a protective flap. Also it conveniently ties at the patient's front instead of side. 6 or 12 in carton.

**SYNOL LIQUID SOAP is also a "public health product" in the sense that its use by patients reduces the danger of contagion from hand contact. Many physicians recommend it in gonorrhoea, smallpox, diphtheria, tuberculosis, influenza and other communicable diseases. 4 oz. and 10 oz. bottles.**

Johnson & Johnson New Brunswick, N. J., U. S. A.

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# *Who* Should Wear Nose-and-Mouth Masks?

**1. Patients who cough while being examined, to protect the practitioner against innocent infection with colds, tuberculosis, etc. Laryngologists and bronchoscopists especially, please note! 2. Machinists, to prevent inhalation of emery and other dust. 3. Members of patients' families, to guard against scarlet fever, measles, diphtheria, and tonsillitis contacts. 4. Surgeons and surgical nurses during operations. And all nurses, if diphtheria carriers. 5. Dentists, during aseptic procedures and also while afflicted with fetid breath**

Johnson's Nose-and-Mouth Masks contain a flexible metal strip that hugs the nose and prevents fogging of eyeglasses. Launderable. Sterilizable. Economical. 12 in a box.

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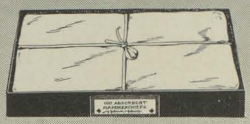
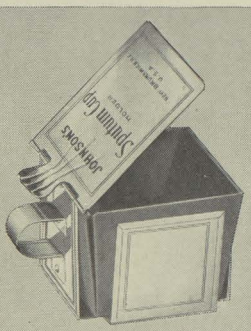


# Other J. & J. Products
## *in the interest of public health*




**Lister's Pocket Sputum Cup*.** An envelope of waterproof pressed paper with tightly closing cover. Lined with highly absorbent material so that coat pocket is kept clean. Particularly convenient when patient travels. May be burned after day's use, inexpensive, packed 25 in carton.

**Johnson's Handkerchiefs*** are preferred to cups by some patients. Made of Red Cross Gauze, prepared with a deodorant. 12″ square, 100 in a box. Cheap enough to be burned after use.

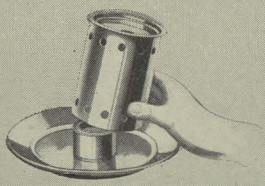
**Johnson's Sputum Cup Holders and Refills.** Practical in patient's home or workplace. Cup* is water-proof, of ample capacity, not easily capsized in holder which is durable, rustproof and readily disinfected. 10, 20 and 100 cups nested in cartons.

**Camphenol* as an all-around antiseptic** in tuberculosis and other contagious diseases is still difficult to excel after forty years' continuous service. Much less irritating, toxic and caustic than pure carbolic acid Camphenol is also more powerful, miscible, pleasant in odor and economical. 1, 3 and 8 oz. screw cap bottles.

**Lister's Formaldehyd Fumigator** combines efficiency with safety for sick-room fumigation. Convenient because it burns solidified alcohol. Liberates gas with great rapidity. Three sizes as per U. S. Public Health Service Bulletin No. 42: Small, medium and large for 500, 1,000 and 2,000 cubic feet area respectively.

**Synol Liquid Soap* for clean hands** may be used by patient and family alike in influenza, tonsillitis, diphtheria, scarlet fever, tuberculosis, etc. 4 and 10 oz. bottles.

**Samples available to physicians*



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# Other Public Health Literature Published by Johnson & Johnson

THE present booklet* represents the 1928 version of one of the "Contagious Disease Bulletins" we commenced publishing as early as 1886. It is planned to rewrite the entire series of pioneer booklets which fulfilled a real mission in the earlier days when public health and preventive medicine had fewer strong champions than they now enjoy.

Far from conflicting with, we feel that these activities to-day form a valuable supplement to the able efforts of national, state and local health authorities in "selling" the better health idea to the public. Other recent literature along these lines:

**Hygiene in Maternity.**† 24 page booklet, 40 illustrations. Helpful suggestions to expectant mothers presented in a practical, cheerful, understandable way. Signs of pregnancy, confinement date, elimination, bathing, clothing, diet, menus, exercise, air, sunshine, rest, worry and excitement, mouth and teeth, traveling, marital relations, breasts, nausea and vomiting, heartburn, when to send for doctor, supplies and dressings, etc., etc.

**Personal Instructions Blanks.**† "Nineteen points" for the G. C. patient during treatment. These forms are padded and will be imprinted with the physician's name and address, upon request.

**Conquering Diphtheria. A Graphic Review*** 6 page article in NOTES AND ABSTRACTS, March, 1927. A series of 12 significant charts together with historical high lights. Excellent material for lectures to nurses and child welfare, mother-teacher meetings, etc.

**Is Smallpox Vaccination Worth While?*** 3 page article in NOTES AND ABSTRACTS, May, 1927. With a page addendum *Ibid.*, November, 1927. 11 charts which, like the above-referred-to article may be found valuable for teaching purposes. Both sets of charts have been complimented very highly by public health authorities.

*Limited supply available for teaching and demonstration purposes.
†Ample supply available for distribution to patients.

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